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Analytical synthesis of state observer for time-varying dynamic system in the presence of signal perturbations

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Abstract

© 2017 IEEE. The problem of the analytical synthesis of reduced order state observer for dynamic system, which is exposed to signal and parametric perturbations, has been considered. The conditions under which it is possible to build a nonlinear observer with an estimation error of the state vector, which asymptotically tends to zero, have been formulated. Formulas for calculation the matrix coefficients of the observer based on the use of matrix canonization technology have been obtained. An algorithm for observer synthesis, the efficiency of which is confirmed by methodological example, has been proposed.

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Keywords

matrix canonization, signal perturbations, state observer, time-varying dynamic system

References

[1] P. J. Antsaklis and A. N. Michel, Linear systems. N. Y.: McGraw-Hill, 1997.

[2] D. G. Luenberger, "Observers for multivariable systems, " IEEE Trans. Autom. Control, no. 11, pp. 190-197, 1966.

[3] J. OReilly, Observers for linear systems. London: Academic Press, 1983.

[4] K. Ogata, Modern Control Engineering, Fourth Edition. New Jersey: Prentice Hall, 2002.

[5] A. Z. Asanov and D. N. Demyanov, "Analytical Synthesis of Functional Low-Order Observers, " Journal of Computer and Systems Sciences International, vol. 54, no. 4, pp. 505-513, 2015.

[6] V. N. Bukov, System Embedding. Analytical Approach to the Analysis and Synthesis of Matrix Systems (in Russian). Kaluga: Izd. Nauch. Lit. N. F. Botchkarevoi, 2006.

[7] V. N. Bukov and V. N. Ryabchenko, "Emdedding of Systhems. Promatrices, " Automation and Remote Control, vol. 61, no. 4, pp. 554-567, 2000.

[8] A. Z. Asanov and D. N. Demyanov, "Analytical Synthesis of Invariant reduced-order State Observer, " Optoelectronics, Instrumentation and Data Processing, vol. 49, no. 6, pp. 546-552, 2013.

[9] I. Z. Akhmetzyanov, "Certificate of State Registration of Computer Program 2015617953 RF. Matrix Canonization Program, " Rightholder FGAOU VPO KFU, No. 2015614621; Appl. 29.05.2015; Publ. 20.08.20